# 8056

## Medium-Mu Triode

**NUVISTOR TYPE**

**For Use with Low-Voltage Power Supplies in Industrial and Military Applications**

### GENERAL DATA

**Electrical:**

| | | |
|---|---|---|
| Heater Characteristics and Ratings: | | |
| Voltage (AC or DC) | 6.3 ± 0.6 | volts |
| Current at heater volts = 6.3 | 0.135 | amp |
| Peak heater-cathode voltage: | | |
| Heater negative with respect to cathode | 100 max. | volts |
| Heater positive with respect to cathode | 100 max. | volts |
| Direct Interelectrode Capacitances (Approx.): | | |
| Grid to plate | 2.1 | pf |
| Grid to cathode, shell, and heater | 4.0 | pf |
| Plate to cathode, shell, and heater | 1.7 | pf |
| Plate to cathode | 0.34 | pf |
| Heater to cathode | 1.4 | pf |

**Characteristics, Class A$_1$ Amplifier:** ←

| | | |
|---|---|---|
| Plate Supply Voltage | 24 | volts |
| Grid | Connected to negative end of cathode resistor | |
| Cathode Resistor | 100 | ohms |
| Amplification Factor | 11.5 | |
| Plate Resistance (Approx.) | 1530 | ohms |
| Transconductance | 7500 | μmhos |
| Plate Current | 8.7 | ma |
| Grid Voltage (Approx.) for plate μa = 50 | -5 | volts |

**Mechanical:**

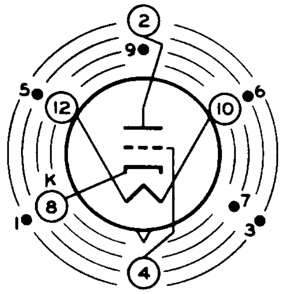
| | |
|---|---|
| Operating Position | Any |
| Type of Cathode | Coated Unipotential |
| Maximum Overall Length | 0.800" |
| Maximum Seated Length | 0.625" |
| Maximum Diameter | 0.440" |
| Weight (Approx.) | 1.9 grams |
| Envelope | Metal Shell MT4 |

Socket:
- Crimp Mounting —
  - Cinch Mfg.,Co., 1026 South Homan Ave., Chicago 24, Ill., No.133 65 10 001.
  - Industrial Electronic Hardware Corp., 109 Prince Street, New York 12, N.Y., No.MSN 0905-1, MSN 0905-2, MSN 0905-3; or equivalent.
- Flange Mounting —
  - Cinch Mfg. Co., No.133 65 10 003, or equivalent.
- Printed Board (Stand-off) —
  - Cinch Mfg. Co., No.133 65 10 041, or equivalent.

← Indicates a change.

Base. . . Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)
Basing Designation for BOTTOM VIEW. . . . . . . . . . 12AQ

Pin 1[a] - Do Not Use
Pin 2 - Plate
Pin 3 - Same as Pin 1
Pin 4 - Grid
Pin 5 - Same as Pin 1
Pin 6 - Same as Pin 1
Pin 7 - Same as Pin 1
Pin 8 - Cathode
Pin 9 - Same as Pin 1
Pin 10 - Heater
Pin 12 - Heater



INDEX=LARGE LUG
●=SHORT PIN; IC—DO NOT USE

## INDUSTRIAL SERVICE

**Maximum Ratings,** *Absolute-Maximum Values:*

*For operation at any altitude*

| | | |
|---|---|---|
| PLATE VOLTAGE . . . . . . . . . . . . . . . | 50 max. | volts |
| GRID VOLTAGE: | | |
| Negative-bias value . . . . . . . . . . . | 55 max. | volts |
| Peak-positive value . . . . . . . . . . . | 2 max. | volts |
| GRID CURRENT. . . . . . . . . . . . . . . . | 2 max. | ma |
| CATHODE CURRENT . . . . . . . . . . . . . . | 15 max. | ma |
| PLATE DISSIPATION . . . . . . . . . . . . . | 0.45 max. | watt |

→ **Typical Operation:**

| | | | |
|---|---|---|---|
| Plate Supply Voltage. . . . . . . . . . . | 12 | 24 | volts |
| Grid Supply Voltage . . . . . . . . . . . | – | 0.7 | volt |
| Grid Resistor . . . . . . . . . . . . . . | 33000 | – | ohms |
| Amplification Factor. . . . . . . . . . . | 12 | 12 | |
| Plate Resistance (Approx.). . . . . . . . | 1500 | 1500 | ohms |
| Transconductance. . . . . . . . . . . . . | 8000 | 8000 | μmhos |
| Plate Current . . . . . . . . . . . . . . | 5.5 | 9.5 | ma |

**Maximum Circuit Values:**

| | | |
|---|---|---|
| Grid-Circuit Resistance:[b] | | |
| For fixed-bias operation. . . . . . . . . | 10 max. | megohms |
| For cathode-bias operation. . . . . . . . | 10 max. | megohms |

→ [a] Pin is of a length such that its end does not touch the socket insertion plane.

[b] For operation at metal-shell temperatures up to 150° C., metal-shell temperatures are measured in zone "A" (See *Dimensional Outline*). For temperatures above 150° C., see accompanying *Grid-Circuit-Resistance Rating Chart*.

→ **CHARACTERISTICS RANGE VALUES**

| | *Note* | *Min.* | *Max.* | |
|---|---|---|---|---|
| Heater Current. . . . . . . . . . . | 1 | 0.125 | 0.145 | amp |
| Direct Interelectrode Capacitances: | | | | |
| Grid to plate . . . . . . . . . . | 2 | 1.8 | 2.4 | pf |

→ Indicates a change.

| | Note | Min. | Max. | |
|---|---|---|---|---|
| Grid to cathode, shell, and heater | 2 | 3.4 | 4.6 | pf |
| Plate to cathode, shell, and heater | 2 | 1.4 | 2.0 | pf |
| Heater to cathode | 2 | 1.1 | 1.7 | pf |
| Plate to cathode | 2 | 0.26 | 0.42 | pf |
| Plate Current (1) | 1,3 | 6.7 | 10.7 | ma |
| Plate Current (2) | 1,4 | – | 50 | μa |
| Transconductance (1) | 1,3 | 6500 | 8500 | μmhos |
| Transconductance (2) | 3,5 | 5700 | – | μmhos |
| Transconductance Change: Difference between transconductance (1) and transconductance (2), expressed in per cent of transconductance (1) | – | – | 15 | % |
| Reverse Grid Current | 1,6 | – | 0.05 | μa |
| Amplification Factor | 1,3 | 9 | 14 | |
| Heater-Cathode Leakage Current: | | | | |
| Heater negative with respect to cathode | 1,7 | – | 5 | μa |
| Heater positive with respect to cathode | 1,7 | – | 5 | μa |
| Leakage Resistance: | | | | |
| Between grid and all other electrodes tied together | 1,8 | 1000 | – | megohms |
| Between plate and all other electrodes tied together | 1,9 | 1000 | – | megohms |

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 24, cathode resistor = 100 ohms, and cathode-bypass capacitor = 1000 μf.

Note 4: With dc plate volts = 24, dc grid volts = -10, and metal shell connected to ground.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With dc plate volts = 40, grid supply volts = -2, grid resistor = 1 megohm, and metal shell connected to ground.

Note 7: With 100 volts dc applied between heater and cathode.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together.

Note 9: With plate 100 volts negative with respect to all other electrodes tied together.

## SPECIAL RATINGS & PERFORMANCE DATA

**Shock Rating:**

Impact Acceleration . . . . . . . . . . . . . 1000 max. g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-impact (flyweight) Shock Machine and are subjected to 20 blows at the specified maximum impact acceleration. At the end of this test, tubes are criticized for change in transconductance, reverse grid

current, and heater-cathode leakage current, and are then subjected to the Variable-Frequency Test described below.

**Fatigue Rating:**

Vibrational Acceleration. . . . . . . . . . 2.5 max. g

This test is performed on a sample lot of tubes to determine ability of tube to withstand the specified vibrational acceleration. Tubes are rigidly mounted, supplied with nominal heater voltage only, and subjected for 48 hours to 2.5-g vibrational acceleration at 60 cycles per second in the $X_1$ position. At the end of this test, tubes are criticized for the same characteristics and end-point values as in the Shock Rating Test described above.

**Variable-Frequency Vibration Performance:**

This test is performed on a sample lot of tubes from each production run. The tube is operated under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate-load resistor of 2000 ohms. During operation, tube is vibrated in the $X_1$ position through the frequency range from 50 to 15,000 cycles per second under the following conditions: a sweep rate of one octave per 30 seconds from 50 to 3000 cps, a 7-second sweep from 3000 to 15,000 cps, and a constant vibrational acceleration of 4 g. During the test, tube must not show an output voltage across the plate-load resistor in excess of: (1) 20 rms millivolts from 50 to 3000 cps, (2) 50 peak millivolts from 3000 to 6000 cps, and (3) 500 peak millivolts from 6000 to 15,000 cps.

**Low-Pressure Voltage-Breakdown Test:**

This test is performed on a sample lot of tubes from each production run. In this test, tubes are operated with 250 rms volts applied between plate and all other electrodes and will not break or show evidence of corona when subjected to air pressures equivalent to altitudes of up to 100,000 feet.

**Heater Cycling Life Performance:**

Cycles of Intermittent Operation. . . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 8.5 cycled one minute on and two minutes off; heater 180 volts negative with respect to cathode; grid, plate, and metal shell connected to ground. At the end of this test, tubes are tested for open heaters and heater-cathode shorts.

**Shorts and Continuity:**

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-1D, Amendment 2, Paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper[c]. See accompanying *Shorts-Test Acceptance-Limits* curve. Tubes are criticized for permanent or temporary shorts and open circuits.

**Early-Hour Stability Life Performance:**

This test is performed on a sample lot of tubes from each production run to insure that tubes are properly stabilized. In this test, tubes are operated for 20 hours at maximum-rated plate dissipation. After 2 hours of operation and again after 20 hours of operation, tubes are checked for transconductance under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (I). A tube is rejected if its transconductance after 2 or 20 hours of operation has changed more than 10 per cent from the 0-hour value.

**100-Hour Life Performance:**

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early-hour inoperatives. Tubes are operated for 100 hours at maximum-rated plate dissipation, and then subjected to the Shorts and Continuity Test previously described. Tubes must then show a transconductance of not less than 5500 μmhos under the ← conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (I).

**1000-Hour Conduction Life Performance:**

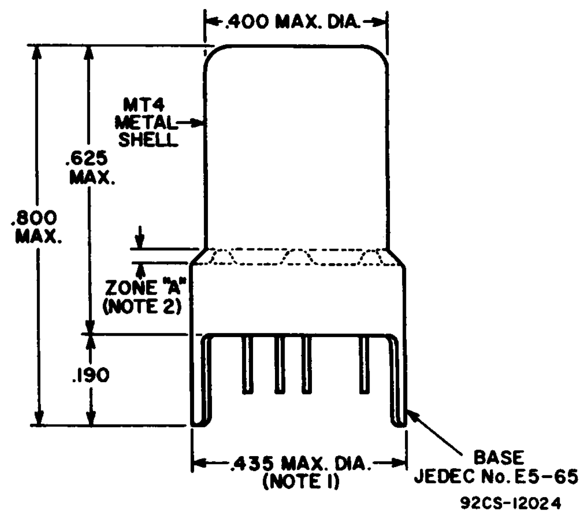
This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation[d], and then criticized for inoperatives, reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, the average change in transconductance of the lot from the 0-hour value for Transconductance (I) specified in CHARACTERISTICS RANGE VALUES, must not exceed 15 per cent at 500 hours, and 20 per cent at 1000 hours.

**1000-Hour Standby Life Performance:**

This test is performed on a sample lot of tubes from each production run. The tubes are operated for 1000 hours with only heater voltage applied. Tubes are criticized for interelectrode leakage, reverse grid current, and for cathode inter- ← face resistance greater than 25 ohms. Interface resistance is measured by Method B of ASTM specification F300-57T.

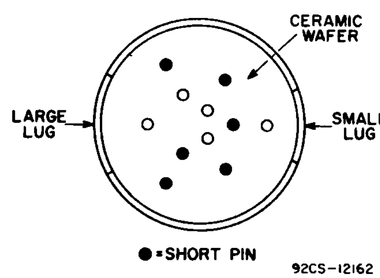
[c] Specifications for tapper supplied on request.
[d] At metal-shell temperature of 150° C.

← Indicates a change.

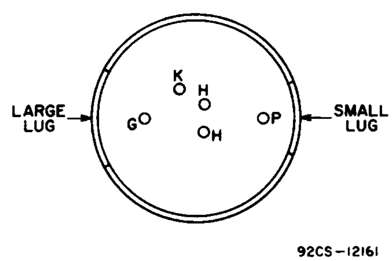



DIMENSIONS IN INCHES

BOTTOM VIEW
Showing Arrangement for All 11 Base Pins



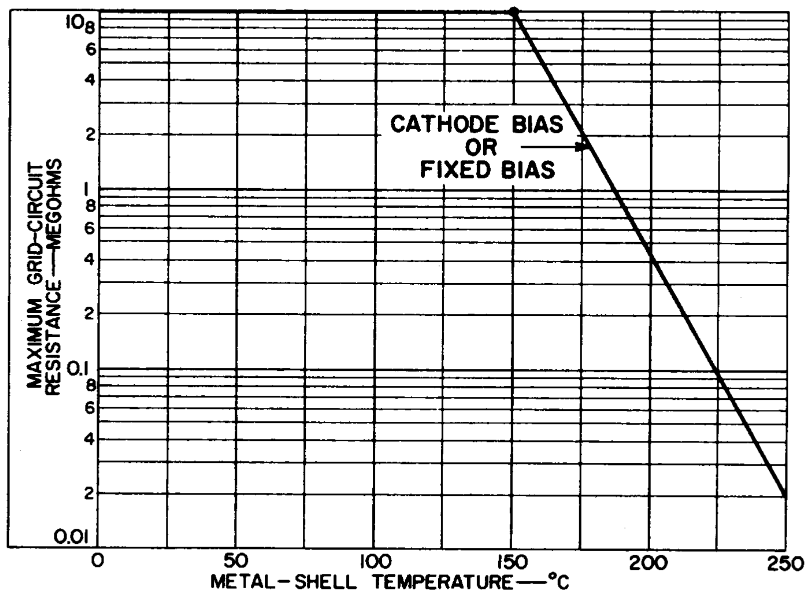

MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown




**NOTE 1:** MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

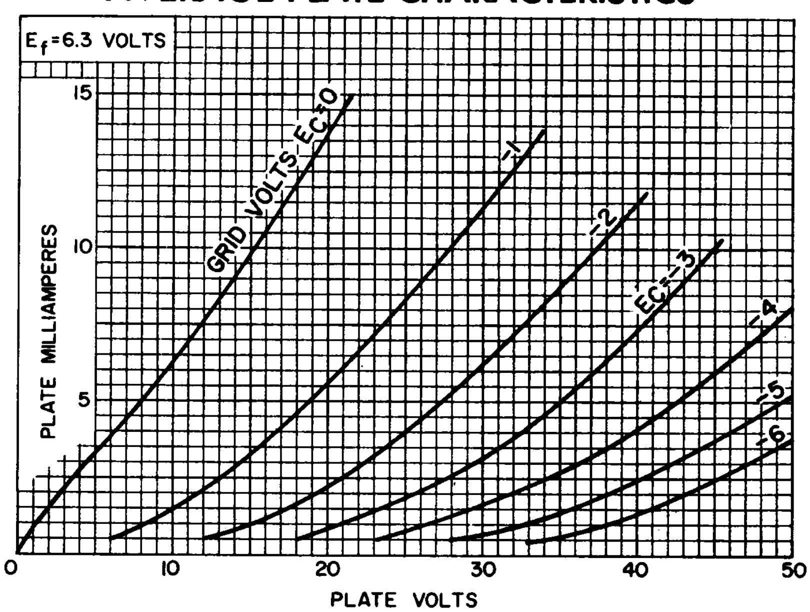
**NOTE 2:** METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

## GRID-CIRCUIT-RESISTANCE RATING CHART



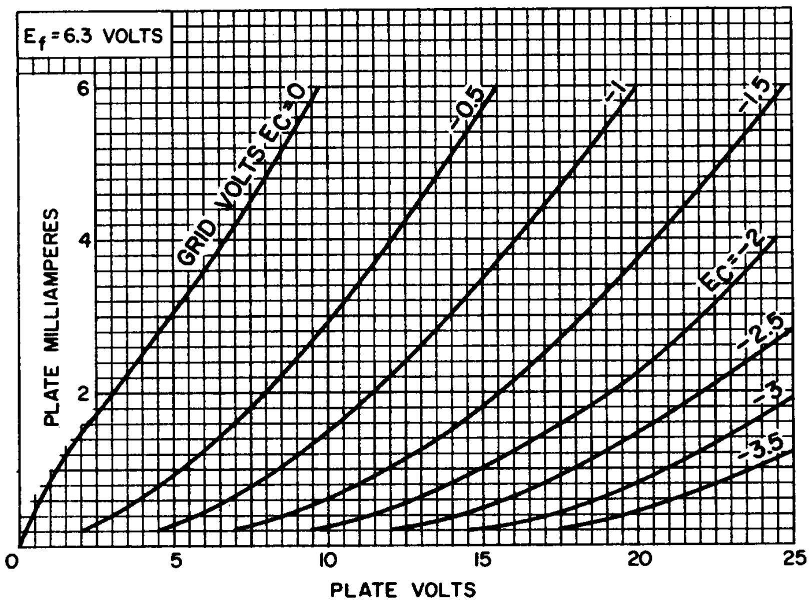

92CS-11479R1

## AVERAGE PLATE CHARACTERISTICS



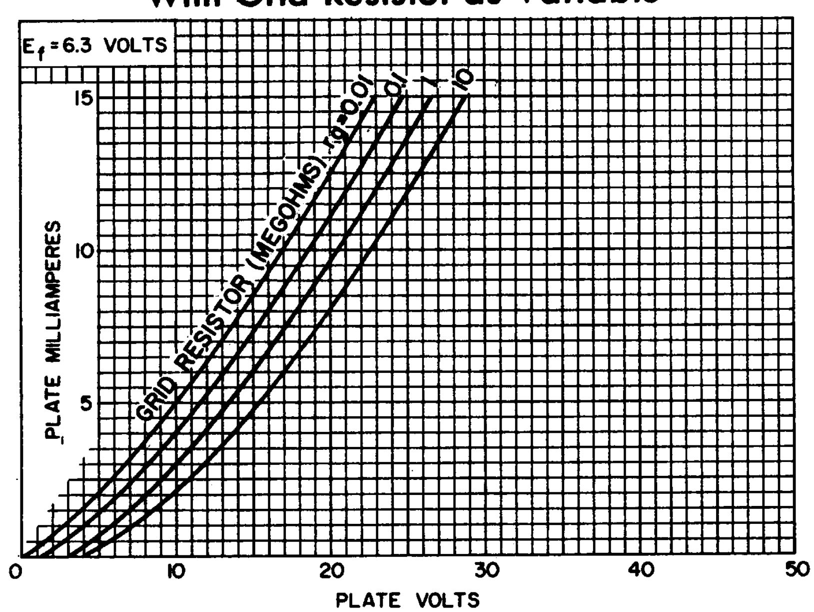

92CS-11469R1

## AVERAGE PLATE CHARACTERISTICS



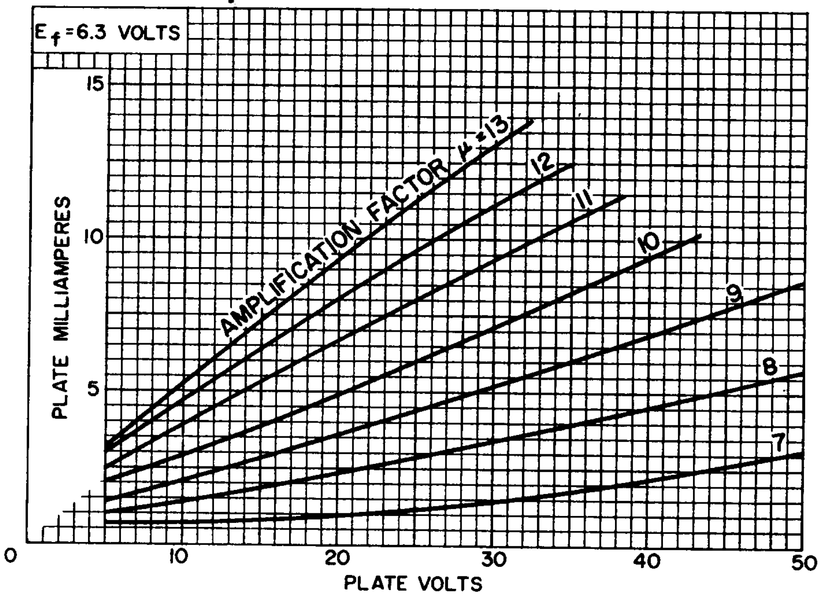

92CS-11467

## AVERAGE PLATE CHARACTERISTICS With Grid Resistor as Variable



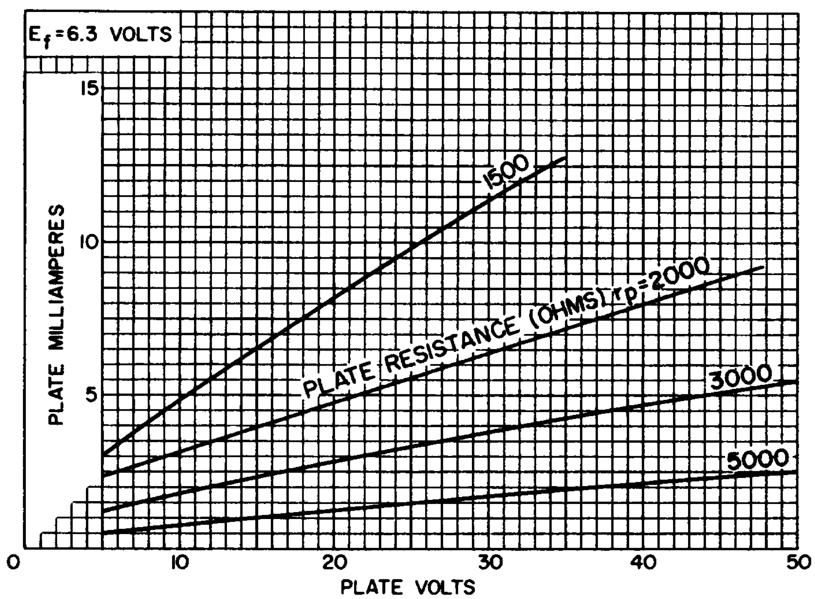

92CS-11466

## AVERAGE PLATE CHARACTERISTICS
## With Amplification Factor as Variable



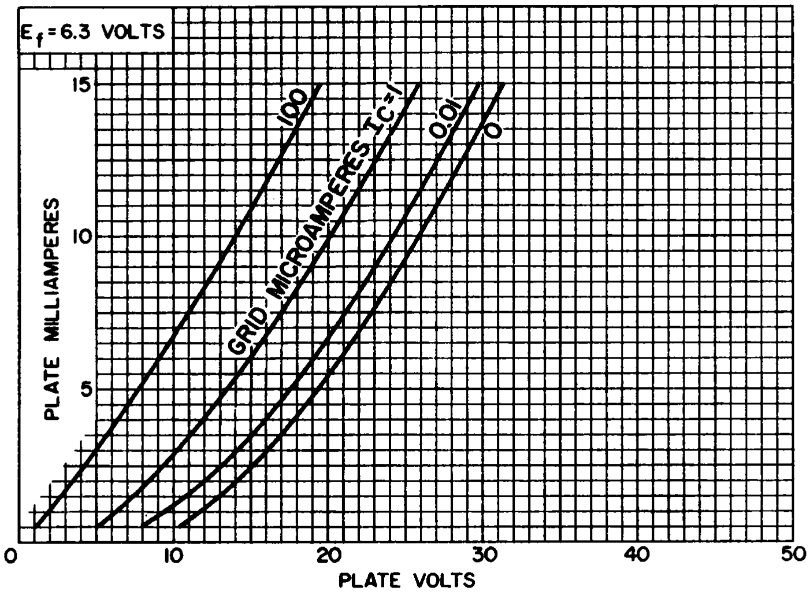

92CS-11471R1

## AVERAGE PLATE CHARACTERISTICS
## With Plate Resistance as Variable



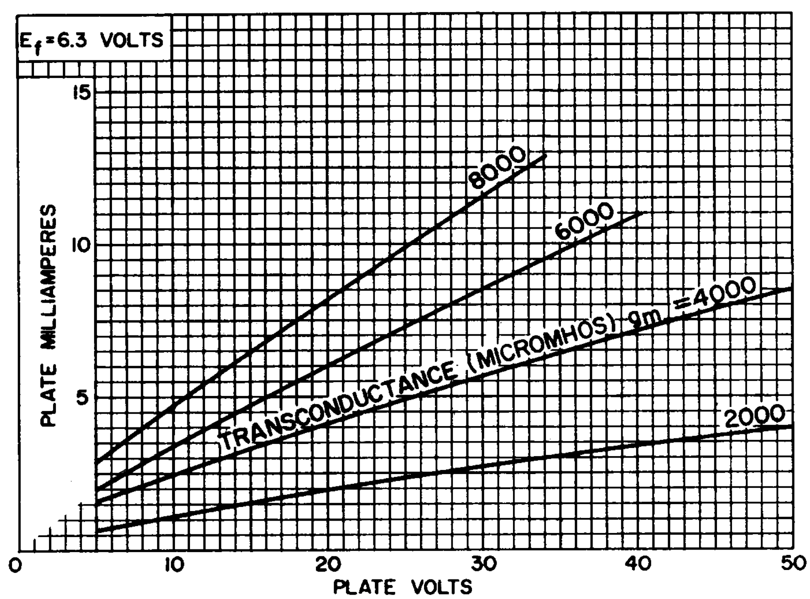

92CS-11465R2

## AVERAGE PLATE CHARACTERISTICS
## With Grid Current as Variable




92CS-11468

## AVERAGE PLATE CHARACTERISTICS
## With Transconductance as Variable




92CS-11470R2

## SHORTS-TEST ACCEPTANCE LIMITS

